Message Text

UNCLASSIFIED

PAGE 01 STOCKH 04040 01 OF 05 221417Z
ACTION EB-08

INFO OCT-01 EUR-12 ISO-00 DODE-00 NSAE-00 USIA-15
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FM AMEMBASSY STOCKHOLM
TO SECSTATE WASHDC PRIORITY 1768

UNCLAS SECTION 1 OF 5 STOCKHOLM 4040

C O R R E C T E D C O P Y (TEXT PARA 3.)

E.O. 11652: N/A
TAGS: ETRD, SW
SUBJ: STANSAAB APPLICATION FOR AIR TRAFFIC CONTROL SYSTEM

REF: STATE 223234

FOLLOWING ARE ANSWERS TO QUESTIONS RAISED IN REFTEL RECEIVED FROM STANSAAB SEPT 21.

1. HOW CAN TRANSFER OF TECHNOLOGY BE AVOIDED?

CONTRARY TO THE OPINION EXPRESSED BY THE WASHINGTON AUTHORITIES, THE TERCAS PROJECT HAS TO BE REGARDED AS A TURN-KEY DELIVERY. THE CUSTOMER WILL NOT PARTICIPATE IN THE DESIGN OR DEVELOPMENT OF NEITHER HARDWARE NOR SOFTWARE IN ANY WAY.

AS THE SYSTEM HAS TO BE ADAPTED TO SPECIFIC SOVIET ATC OPERATIONAL REQUIREMENTS THE CUSTOMER NATURALLY HAS TO PARTICIPATE IN STATING THE OPERATIONAL REQUIREMENTS. THE SPECIFICATION RESULTING FROM THESE REQUIREMENTS DOES NOT DEAL WITH THE DESIGN OF THE SYSTEM FUNCTIONS.

IN ADDITION, AS IS NORMAL AND MANDATORY IN DELIVERIES OF THIS
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PAGE 02 STOCKH 04040 01 OF 05 221417Z

TYPE OF SYSTEMS, THE CUSTOMER WILL BE INVOLVED IN ACCEPTANCE TESTS DURING THE COMMISSIONING PERIOD. THIS ACTIVITY IS, HOWEVER, LIMITED TO VISUAL QUALITY INSPECTION AND FUNCTIONAL CHECKS. FROM THIS FOLLOWS THAT THE CUSTOMER WILL NOT REQUIRE AND WILL NOT BE GIVEN ANY ACCESS TO THE TECHNOLOGY RELATED TO THE REALIZATION OF THE SYSTEM FUNCTIONS.

THE TRAINING COURCES IN SOFTWARE AND HARDWARE WILL NOT COVER THE DETAILED DESIGN, THEY ARE DESIGNED WITH CONSIDERATION TO THE FACT THAT STANSAAB HAS THE CONTRACTIUAL COMMITMENT TO PERFORM MAINTENANCE THROUGHOUT THE LIFE-TIME OF THE SYSTEM. THE CUSTOMER WILL ONLY BE GIVEN THE KNOWLEDGE NECESSARY TO ASSIST THE STANSAAB MAINTENANCE PERSONNEL.

IN CONCLUSION, STANSAAB WILL NOT GIVE THE CUSTOMER ANY KNOW-LEDGE OF THE ITEMS SPECIFIED BY THE US AUTHORITIES. SUCH KNOWLEDGE WILL NOT BE REQUIRED IN ORDER TO OPERATE THE SYSTEM AND IT HAS NEITHER BEEN REQUESTED BY THE CUSTOMER, NOR INCLUDED IN STANSAAB'S CONTRACTUAL COMMITMENT.

2. WHAT SYSTEM SOFTWARE CONTROLS ARE PLANNED TO RELIABLY AND SENSITIVELY DETECT ALTERATIONS OF THE SIFTWARE APPLICATION PACKAGE?

THE MAINTENANCE ASSISTANCE CONTRACT WILL ENABLE STANSAAB TO DETECT ANY POSSIBLE ATTEMPT BY THE CUSTOMER TO INTRODUCE SOFT-WARE ALTERATIONS. STANSAAB IS GRANTED ACCESS TO ALL SITES. FURTHERMORE, AS STANSAAB WILL HAVE FULL CONTROL OF THE SOFTWARE APPLICATION PACKAGE, ANY ALTERATIONS WILL EASILY BE DETECTED BY A COMPARISON OF THE ACTUAL SYSTEM STATUS WITH THAT OF THE ORIGINALLY DELIVERED REFERENCE SYSTEM.

WHEN FUTURE SOFTWARE MODIFICATION WILL BE REQUIRED, THOSE UNCLASSIFIED

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PAGE 03 STOCKH 04040 01 OF 05 221417Z

WILL BE MADE BY STANSAAB IN SWEDEN WHERE THE NECESSARY PROGRAM PRODUCTION FACILITIES ARE AVAILABLE.

3. HOW DOES THE COMPUTER SOFTWARE CORRELATE THE INPUTS FROM MULTIPLE SECONDARY RADARS AT SEPARATE SITES IN ORDER TO DETERMINE TH FLIGHT TRACK OF AN AIRCRAFT?

THERE IS NO CORRELATION OF INFORMATION FROM SECONDAY RADARS AT SEPARATE SITES EXCEPT IN BOUNDARY ZONES BETWEEN THE DIFFERENT BOXES IN THE MOASIAC PATTERN. IN ANY MOMENT ONLY ONE RADAR SOURCE IS ALLOTTED TO EACH BOX. A TRACK, WHICH IS "OUT-BOUND" IN ONE BOX, WILL THEN ENTERING INTO THE BOUNDARY ZONE OF THE BOX INITIATE THE AUTOMATIC SEARCH FOR A DUPLICATE TRACK "INBOUND" INTO THE SUBSEQUENT BOX ON THE RADAR ALLOTTED TO THAT BOX. WHEN A CORRESPONDING TRACK IS FOUND THE IDENTITIES OF THE TWO TRACKS ARE VERIFIED BY SSR IDENTITY CODE AND IN SITUATIONS OF MOMENTARY UNCERTAINTY ALSO BY POSITION, HEADING AND SPEED.

4. WHAT ARE THE SOFTWARE ALGORITHMS USED TO ACCOMPLISH THE SAID INTERNETTING?

THE CORRELATION BETWEEN TRACKS ORIGINATING FROM DIFFERENT
RADAR SOURCES RELATED TO SUBSEQUENT BOXES IN THE MOSAIC
PATTERN ALONG A TRACK IS BASED UPON THE FOLLOWING LOGIC
CRITERIA:

--UNIQUE CORRESPONDENCE OF SSR IDENTITY CODE
--POSITIONS BETWEEN TRACKS WITHIN A PRESET DISTANCE
--HEADING DEVIATION BETWEEN TRACKS WITHIN A PRESET AMOUNT
--SPEED DEVIATION BETWEEN TRACKS WITHIN A PRESET AMOUNT.

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PAGE 01 STOCKH 04040 02 OF 05 221032Z
ACTION EB-08

INFO OCT-01 EUR-12 ISO-00 DODE-00 NSAE-00 USIA-15
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P 220900Z SEP 77
FM AMEMBASSY STOCKHOLM
TO SECSTATE WASHDC PRIORITY 1769

UNCLAS SECTION 2 OF 5 STOCKHOLM 4040

5. WHAT IS THE DATA FORMAT AND WHAT COMPARISON FUCTIONS TAKE
PLACE?

THE INPUT DATA FORMAT IS:

POSITION - THETA 13 BITS MSB 180 DEGREES
- RHO 13 BITS LSB 62.5 METERS
MODA A - ICAO IDENTITY 12 BITS -ABCD"
MODE C - FLIGHT LEVEL 14 BITS CODED BCD
MODE N - USSR IDENTITY 20 BITS TAILNUMBER 5 DIGITS
CODED BCN
MODH H - ALTITUDE/FUEL RETAINED/DISTRESS
14 BITS CODED BCD ALTITUDE
1 BIT RELATIVE/ABSOLUTE ALTITUDE
1 BIT DISTRESS
4 BITS CODED FUEL RETAINED

AT THE ABOVE RECEIVED INFORMATION EITHER AT THE TWO IDENTITY
ITEMS WILL BE USED FOR DIRECT CORRELATION BETWEEN TRACKS
FROM DIFFERENT RADAR SOURCES WHEREAS POSITION INFORMATION,
AND HEADING AND SPEED DRIVED FROM CONSECUTIVE RADAR POSITIONS

WILL EXCEPTIONALLY BE USED FOR CORRELATION IN LIEU OF MOMENTARY
LACK OF POSITIVE SSR IDENTIFICATION.

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PAGE 02 STOCKH 04040 02 OF 05 221032Z

THE POSITION INFORMATION FROM THE DIFFERENT RADAR SOURCES IS
CONVERTED BY USE OF A SIMPLE SLANT STEREOGRAPHICAL PROJECTION
METHOD INTO A COMMON S/Y-SYSTEM WITHOUT ANY COMPENSATION
FOR INDIVIDUAL AIRCRAFT HEIGHT, I.E. SLANT RANGE WILL BE USED
DIRECTLY IN THE CONVERSION.

6. IS TRANSPONDER INFORMATION A NECESSITY FOR THE CORRELATION?

YES, OTHERWISE A QUALIFIED TRANSFER OF IDENTIFICATION CANNOT
TAKE PLACE ACCORDING TO ICAO STANDARDS.

7. WHAT ARE THE PESENT CAPABILITIES AND CAPACITY OF THE
HARDWARE AND SOFTWARE TO ACCEPT AND INTEGRATE SUCH PRIMARY
RADAR DATA, PRIMARY/SECONDARY RADAY INTEGRATED DATA, AND
HEIGTH-FINDING DATA? WHAT SPECIFIC HARDWARE CHANGES AND
SOFTWARE MODULES WOULD BE REQUIRED TO ADD THIS CAPABILITY TO
THE SYSTEM IF NOT ALREADY PRESENT?

THE SSR DIGITIZERS AT THE RADAR SITES ARE CONNECTED TO THE
RESPECTIVE CONTROL CENTRE VIA NARROWBAND COMMUNICATIONS LINKS
WITH A TRANSMISSION RATE OF 2.400 BITS PER SECOND. A SPECIAL
MESSAGE IS COMPOSED IN THE TRANSMITTER INTEGRATED WITHIN THE
DIGITIZER. THIS MESSAGE IS STRICKLY CONFINED TO RANGE, SSR
CODE AND SSR ALTITUDE INFORMATION. THE MESSAGE FORMAT CODE
DOES NOT ALLOW ANY ADDITION HEIGHT INFORMATION.

ON THE CONTROL CENTRE SIDE THE MESSAGE IS RECEIVED BY A TER-
MINAL COMMUNICATION PROCESSOR, TCP, CONNECTED TO THE BUS
SYSTEM OF THE COMPUTER, WHICH DECODES THE MESSAGE FOR STORING
IN THE CORE STORAGE FOR FURTHER PROCESSING BY THE COMPUTER.

THE TCP CONSISTS OF THREE DIFFERENT PARTS:

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PAGE 03 STOCKH 04040 02 OF 05 221032Z

- LINE ADAPTER, LA, PERFORMING THE INTERFACE TO THE MODEM.
- THE DECODING IS REALIZED BY A MICROPROGRAMABLE LINE ADAPTER,
  MLA, IN WHICH MICROCODE IS STORED IN PROMS.
- TERMINAL COMMUNICATION CONTROLLER, TCC, ACTING AS MULTI-
  PLEXOR FOR MIA'S STORING DATA IN THE CORE STORAGE.

AN INTEGRATION OF PRIMARY RADAR STATIONS AND ADDITIONAL INFORMATION SUCH AS HEIGHT INFORMATION COULD THEORETICALLY BE DONE IN TWO DIFFERENT WAYS:

1) INTEGRATION OF THE ADDITIONAL INFORMATION AT THE RADAR SITES UTILIZING EXISTING LINES.
2) CONNECTION OF ADDITIONAL COMMUNICATIONS LINES TO THE CONTROL CENTRES.

IN THE FIRST CASE, AN INTEGRATION USING THE STANSAAB SSR-EXTRACTOR IS NOT REALISTIC AS THIS EXTRACTOR DOES NOT HAVE INTERFACE NECESSARY TO RECEIVE AND PROCESS OTHER THAN SSR INFORMATION. THUS, THE ONLY POSSIBLE WAY OF IMPLEMENTING EXTRACTED PRIMARY RADAR INFORMATION AT THE RADAR SITE WOULD BE A FULL SUBSTITUTION OF THE STANSAAB EQUIPMENT WITH SOVIET-BUILT EQUIPMENT HANDLING BOTH PRIMARY AND SECONDARY RADAR INFORMATION.

IN ANY CASE, THE FORMAT OF THE RADAR INFORMATION MESSAGE RECEIVED BY A CONTROL CENTRE MUST BE CHANGED WHICH WOULD REQUIRE REDESIGN AND REPROGRAMMING OF THE MLS RECEIVING AND DECODING THE INFORMATION. AS THIS DEVICE IS MICROPROGRAMMABLE A NEW PROGRAM HAS TO BE PRODUCED. AN ACTIVITY LIKE THIS WOULD REQUIRE SPECIFIC KNOWHOW WHICH THE CUSTOMER WILL NOT POSSESS AS WELL AS ACCESS TO SPECIAL PROGRAMMING AIDS, USED AND DESIGNED BY STANSAAB, WHICH ARE NOT PART OF THE DELIVERY.

ADDING EQUIPMENT SUCH AS THE LA AND THE MLA MENTIONED ABOVE FOR CONNECTION OF ADDITIONAL LINKS, WILL REQUIRE SUBSTANTIAL ASSISTANCE AND MAJOR HARDWARE DELIVERIES FROM STANSAAB. THE UNCLASSIFIED

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PAGE 04 STOCKH 04040 02 OF 05 221032Z

EQUIPMENT IN QUESTION IS FULLY INTEGRATED INTO THE COMPUTER SYSTEM AND IS NOT AVAILABLE FROM ANY OTHER SUPPLIER.

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PAGE 01 STOCKH 04040 03 OF 05 221103Z
ACTION EA-12

INFO OCT-01 EUR-12 ISO-00 DODE-00 EB-08 NSAE-00

USIA-15 TRSE-00 ERDA-07 CIAE-00 COME-00 L-03
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FM AMEMBASSY STOCKHOLM
TO SECSTATE WASHDC PRIORITY 1770

UNCLAS SECTION 3 OF 5 STOCKHOLM 4040

REGARDING THE SOFTWARE THE FOLLOWING MODULES HAVE TO BE IMPLEMENTED IN CASE OF INTEGRATION OF PRIMARY RADARS:

- PRIMARY RADAR TRACKING
- PLOT PRESENTATION AND ADMINISTRATION PROGRAM
- EXTENSION OF MOSAIC STRUCTURE FUNCTION

IN ADDITION TO THE ABOVE, EXTENDED DATA FILES HAVE TO BE ADDED, E.G. FOR TRACK DATA AND PLOT BUFFERS.

NO SUCH SOFTWARE FOR HANDLING EXTRACTED PRIMARY RADAR DATA WITH OR WITHOUT HEIGHT-FINDING DATA WILL BE DELIVERED.

AS A CONCLUSION THERE IS NO PRESENT CAPABILITY AND CAPACITY OF EITHER THE HARDWARE OR THE SOFTWARE TO INTEGRATE PRIMARY RADAR DATA, COMBINED PRIMARY/SECONDARY DATA OR HEIGHT FINDING DATA.

8. WHAT IS THE NUMBER OF SECONDARY RADARS THAT CAN BE CONNECTED ABOVE THE NUMBER ALREADYINDICATED? WHAT CHANGES WOULD BE REQUIRED TO SIGNIFICANTLY EXPAND THE SYSTEM CAPABILITIES TO HANDLE ADDITIONAL SECONDARY RADARS?

THE PRESENT CONFIGURATION ALLOWS NO ADDITIONAL SECONDARY
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PAGE 02 STOCKH 04040 03 OF 05 221103Z

RADARS TO BE CONNECTED TO ANY SYSTEM. NO HARDWARE AND SOFTWARE FOR THAT PURPOSE WILL BE INCLUDED IN THE DELIVERY.

THE REQUIRED HARDWARE AND SOFTWARE CHANGES TO EXTEND THE NUMBER OF CONNECTIONS ARE DESCRIBED INTHE ANSWERS TO QUESTION 7.

9. WHAT IS THE MAXIMUM NUMBER OF FLIGHT TRACKS THAT THE HARDWARE AND SOFTWARE CAN ACCOMMODATE ABOVE THE NUMBER ALREADY INDICATED? BY FURTHER UTILIZING THE SECOND ONLINE COMPUTER OR THE REDUNDANT COMPUTERS, WHAT SOFTWARE CHANGES ARE REQUIRED TO SIGNIFICANTLY EXPAND THE NUMBER OF FLIGHT TRACKS THAT THE SYSTEM CAN HANDLE?

DIMENSIONING FIGURES IN THIS CONTEXT ARE:

	NO. OF SECONDARY RADARS	NO. OF TRACKS	FLIGHT PLAN LOAD PROCESSING PERCENT	
MOSCOW ACC	7	325	75	SEPARATE COMPUTER (COMPUTER LOAD 65 PERCENT)
MOSCOW TCC	3	100	75	LIMITED FUCTION
KIEV TCC	1	60	70	INTEGRATED WITH RADAR PROCESSING IN ONE COMPUTER
MINVODY	1	40	70	INTEGRATED WITH RADAR PROCESSING IN ONE COMPUTER

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PAGE 03 STOCKH 04040 03 OF 05 221103Z

THESE FIGURES WERE GIVEN FOR AUTOMATIC TRACKING ON PRIMARY RADAR INFORMATION STILL INCLUDED. THE REMOVAL OF THIS FUNCTION WILL ONLY MARGINALLY REDUCE THE CORE STORAGE REQUIREMENTS RESULTING IN AN INCREMENTAL INCREASE OF SPARE MEMORY CAPACITY. THE COMPUTER TIME LOAD WILL ALSO BE MARGINALLY DECREASED DUE TO THIS FUNCTIONAL REDUCTIONION. HENCE THE SYSTEM CAN THEORE-TICALLY BE SUBJECT TO AN INCREASE OF THE NUMBER OF SIMULTANEOUS SSR-TRACKS. SUCH A SOFTWARE CHANGE WOULD, HOWEVER, REQUIRE QUALIFIED SYSTEM SOFTWARE KNOWLEDGE, THE TRAINING IN WHICH IS NOT GIVEN TO THE SOVIET PERSONNEL.

AS FAR AS THE UTILIZATION OF THE SECOND ON-LINE COMPUTER IS CONCERNED, IT WILL NOT BE POSSIBLE TO SUPPRESS ANY OF THE TWO MAJOR OPERATIONAL FUNCTIONS IN FAVOUR OF THE OTHER AND STILL BE ABLE TO CARRY OUT AN INTEGRATED ATC FUNCTION. THE RADAR DATA FUNCTION IS UTILIZED FOR EXECUTIVE AIR TRAFFIC CONTROL IN PARALLEL WITH EHT FLIGHT PLAN HANDLING FUNCTIONS WHICH ARE EQUALLY ESSENTIAL DUE TO THE LONG TERM PLANNING REQUIREMENTS. HENCE, THE SECOND ON-LINE COMPUTER IN MOSCOW ACC COULD NOT BE ALTER-NATELY USED FOR RADAR DATA PURPOSED UNLESS THE TOTAL ATC OPERATION AT THE CENTRE WOULD BE SIMULTANEOUSLY SHUT DOWN.

THE SYSTEM IS DESIGNED TO MEET HIGH REQUIREMENTS ON OPERATIONAL FUNCTION AVAILABILITY. THE OPERATIONAL FUNCTION IS NORMALLY PERFORMED BY ONE OPERATIONAL COMPUTER CHAIN WHEREAS A SECOND CHAIN IS IN A HOT STAND-BY MODE, READY TO TAKE THE FULL OPERATIONAL BURDEN IN CASE OF A FAILURE IN THE OPERATIONAL CHAIN. THE HIGH AVAILABILITY IS ACHIEVED BY ASSUMING THAT REPAIR

ACTIVITIES CAN BE CARRIED OUT IN ONE CHAIN WHILE THE OTHER IS
IN OPERATION. IF THE STAND-BY COMPUTERS WOULD BE USED FOR
OTHER PURPOSED THE AVAILABILITY WOULD SIGNIFICANTLY DROP TO
A PERFORMANCE LEVEL CERTAINLY BELOW THE OPERATIONALLY

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PAGE 01 STOCKH 04040 04 OF 05 221132Z
ACTION EB-08

INFO OCT-01 EUR-12 ISO-00 DODE-00 NSAE-00 USIA-15
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TO SECSTATE WASHDC PRIORITY 1771

UNCLAS SECTION 4 OF 5 STOCKHOLM 4040

ACCEPTABLE LEVEL SOON RESULTING IN AN UNSERVICEABLE SYSTEM
AS REGARDS ATC OPERATIONS BECAUSE OF THE DRASTICALLY REDUCED
POSSIBILITY TO PERFORM RELEVANT FAULT CORRECTION ACTIVITIES.

ONE OPERATIONAL COMPUTER CHAIN CAN NEVER PROCESS MORE THAN
UP TO SEVEN SECONDARY RADAR INPUTS IN MOSCOW ASS, THREE SECOND-
ARY RADAR IMPUTS IN MOSCOW TCC AND ONE SECONDARY RADAR INPUT
IN KIEV RESPECTIVELY. MINVODY TCC WITHOUT SIGNIFICANT HARDWARE
AND SOFTWARE ADDITIONS (SEE FURTHER UNDER C AND D ABOVE).

THE NUMBER OF RADAR INPUTS TO A SYSTEM CANNOT BE INCREASED BY
UTILIZING THE STAND-BY SIDE OF THE SYSTEM AS THE SYSTEM WILL
THEN NOT ALLOW A RELEVANT DISPLAY OF INFORMATION AS DISPLAYS
WILL ONLY RECEIVE INFORMATION FROM ONE COMPUTER CHAIN AT THE
TIME.

10. WHAT PROVISIONS ARE IN THE SYSTEM FOR HANDLING AIRCRAFT
NOT EQUIPPED WITH ICAO FORMAT TRANSPONDERS? CAN THE SYSTEM
ACCOMMODATE SOVIET MILITARY CODED TRANSPONDERS?

THE SYSTEM CAN ACCOMMODATE RESPONSES FROM TRANSPONDERS EITHER
TRANSPONDING IN ICAO MODA A AND C OR TRANSPONDING ACCORDING
TO SOVIET MODES N AND H (FOR DETAILS SEE ANSWER UNDER 3, 4, 5).
STANSAAB IS UNFAMILIAR WITH ANY OTHER TYPE OF SOVIET CODE
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CONVENTION AND THE SYSTEM WILL ONLY ACCOMMODATE THE ABOVE TWO TYPES OF FORMATS. FOR DETAILS SEE THE FOLLOWING ARTICLES IN AVIATION WEEK AND SPACE TECHNOLIGY: AUGUST 6, 1973, PAGE 2; AUGUST 13, 1973, PAGE 38; OCTOBER 22, 1973, PAGE 103; JUNE 27, 1977, PAGE 16.

11. EXACTLY WHAT ARE THE LIMITATION OF THE DF CAPABILITY OF THE SYSTEM? EXCLUDING PRIMARY RADAR DATA CAN DF BE ACCOMPLISHED FROM OTHER RF INPUT SIGNALS BESIDES TRANSPONDER DATA?

THE SYSTEM CAN HANDLE DF-INFORMATION FROM DF-STATION LOCATED AT THE AERODOMES OF DIRECT CONTROL BY THE TCC'S, THUS FROM FOUR STATIONS IN MOSCOW TCC, FROM TWO STATIONS IN KIEV TCC AND FROM ONE IN MINVODY TCC. EACH DF-STATION IS EQUIPPED WITH MAXIMUM EIGHT DIFFERENT CHANNELS (RF-FREQUENCIES IN THE LOWER ATC-BAND 118-136 MC/S). THE CONTROLLERS AT THE TCC'S CAN SELECT PRESENTATION OF UP TO TWO AVAILABLE CHANNELS FROM THE DF-STATION AVAILABLE TO RESPECTIVE TCC. THE PRESENTATION OF THE RF-TRAFFIC OF A CHANNEL WILL BE A FIXED LENGTH VECTOR WITH ITS BASE IN RESPECTIVE DF-STATION. THE QDM/QDR VALUES WILL BE DISPLAYED AT THE BASE.

THE DF PRESENTATION IS IN NO CASE BASED UPON RADAR INFORMATION, NEITHER PRIMARY NOR SECONDAY RADAR INFORMATION.

12. EXACTLY HOW IS THE INFORMATION FROM DF CORRELATED WITH RADAR INPUTS?

THE SYSTEM WILL NOT PROVIDE ANY CORRELATION FUNCTION BETWEEN DF INFORMATION AND RADAR INFORMATION. THE DF VECTOR PRESENTATION WILL BE ACCOMPLISHED ON RADAR DISPLAYS. THE ONLY CORRELATION PROCEDURE AVAILABLE IS WHEN THE CONTROLLER PERFORMS A VISUAL CORRELATION OF RADAR INFORMATION AND DF-INFORMATION
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ON THE SCREEN.

13. WILL STANSAAB HAVE THE SOFTWARE DONE IN-HOUSE OR WILL A SUBCONTRACTOR BE USED? IS FO, WHICH ARE THE LIKELY COMPANIES TO BE SOLICITED?

STANSAAB WILL DESIGN AND PRODUCE ALL SOFTWARE IN-HOUSE WITH STANSAAB SOFTWARE MANAGERS CONCEPTUALLY RESPONSIBLE FOR THE SOFTWARE SYSTEM LAY-OUT, SPECIFICATION AND PRODUCTION. THE PERSONNEL ENGAGED IN THE SOFTWARE PRODUCTION WILL EITHER BE

STANSAAB EMPLOYEES OR, TO A LIMITED EXTENT, BE HIRED ON A TIME/MATERIAL BASIS FROM CONSULTANCY FIRMS. IT IS A STANDARD PARCTICE WITHIN STANSAAB TO MEET THE IMPACT OF MARKET FLUC-TUATIONS ON THE PRODUCTION VOLUME BY HIRING PERSONNEL ON A SHORT TERM BASIS FROM SMALLER COMPANIES MAINLY IN SWEDEN IN THE SOFT-WARE CONSULTANCY BUSINESS. NO CONTRACT TO A CONSULTANCY FIRM FOR THIS PROJECT WILL BE ON A FIXED PRICE/PERFORMANCE BASIS.

COMPANIES ARE SELECTED WITH CARE AMONG THOSE AVAILABLE ON THE MARKET; EXCEPTIONALLY FOREIGN COMPANIES ARE ENGAGED. IN THIS PROJECT PERSONNEL FROM ONE FOREIGN COMPANY IS ENGAGED, NAMELY SOFTWARE SCIENCES LTD., FARNBOROUGH, ENGLAND.

BECAUSE THE TERCAS PROJECT IS A TURNKEY UNDERTAKING THE FUNCTION-AL RESPONSIBILITY OF THE TOTAL SOFTWARE PACKAGE RESTS SOLELY WITH STANSAAB. FURTHERMORE, THE SOFTWARE PACKAGE FOLLOWS THE STANSAAB GENERAL CONCEPT FOR ATC SYSTEMS AND IS CONSEQUENTLY PROPRIETARY COMPANY INFORMATION, THE DISSEMINATION OF WHICH IS REGULATED BY CONTRACTUAL AGREEMENTS WITH CUSTOMERS AND SUBCONTRACTORS.

14. DOES THE SOFTWARE DEVELOPED (OR BEING DEVELOPED) DEPEND UPON UNIQUE CHARACTERISTS OR INTERFACE SPECIFICATIONS ASSOCIATED WITH THE US EQUIPMENT BEING REQUESTED? IF SO, WHAT DELAYS IN SYSTEM SOFTWARE DEVELOPMENT WILL BE ENCOUNTERED IF OTHER THAT THE REQUESTED US COMPONENTS ARE USED?
UNCLASSIFIED

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PAGE 04 STOCKH 04040 04 OF 05 221132Z

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PAGE 01 STOCKH 04040 05 OF 05 221115Z
ACTION EB-08

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FM AMEMBASSY STOCKHOLM
TO SECSTATE WASHDC PRIORITY 1772

UNCLAS SECTION 5 OF 5 STOCKHOLM 4040

THE SOFTWARE DOES NOT DEPEND ON ANY UNIQUE US EQUIPMENT CHARACTERISTICS OR INTERFACE SPECIFICATIONS.

THE US EQUIPMENT INCLUDED IN TERCAS CONSISTS OF TWO PARTS:

--PERIPHERALS AS COMPLETE SUB-UNITS, E.G. DISK FILES
--COMPONENTS, E.G. INTEGRATED CIRCUITS, IN EQUIPMENT MANI-
FACTURED BY STANSAAB.

PERIPHERALS ARE AVAILABLE FROM OTHER SUPPLIERS, HOWEVER, NOT EXACTLY COMPATIBLE WITH THE INTENDED DEVICES, A SUBSTITUTION WILL HENCE REQUIRE SOME RE-DESIGN OF STANSAAB EQUIPEMTN SUCH AS DEVICE CONTROLLERS. REGARDING SOFTWARE, THE PERIPHERAL DRIVERS OF THE OPERATING SYSTEM WILL IN SOME CASE BE SLIGHTLY MODIFIED. THESE MODIFICATIONS WILL, HOWEVER, NOT AFFECT PRODUCTION OF THE APPLICATION SOFTWARE AND ONLY TO A LIMITED EXTENT THE STANDARD SOFTWARE.

AS FAR AS COMPONENTS SUCH AS SEMICONDUCTORS ARE CONCERNED, IDENTICAL COMPONENTS WITH A FEW EXCEPTIONS CAN BE FOUND FROM OTHER SUPPLIERS. A SUBSTITUTION OF REMAINING TYPES WILL REQUIRE SOME RE-DESIGN OF THE AFFECTED EQUIPMENT. THIS RE-DESIGN WILL, HOWEVER, BE FULLY SOFTWARE COMPATIBLE WITH THE CURRENT DESIGN AND THUS REQUIRE NO SOFTWARE CHANGES.
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PAGE 02 STOCKH 04040 05 OF 05 221115Z

IN CONCLUSION, SUBSTITUTION OF US EQUIPMENT WITH EQUIPMENT FROM OTHER MANUFACTURERS WILL NOT IN ANY SIGNIFICANT WAY IMPACT THE SOFTWARE DEVELOPMENT.
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To: STATE
Type: TE
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